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Vaske et al.

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(54) **ASSEMBLY FOR END GATE**

(71) Applicants: **Michael R. Vaske**, Knoxville, IA (US); **Mark D. Prachar**, Knoxville, IA (US)

(72) Inventors: **Michael R. Vaske**, Knoxville, IA (US); **Mark D. Prachar**, Knoxville, IA (US)

(73) Assignee: **Weller, Inc.**, Knoxville, IA (US)

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E01C 19/42	(2006.01)
E04G 21/10	(2006.01)

(52) **U.S. Cl.**

CPC ***E01C 19/42*** (2013.01); *E04G 21/10* (2013.01); *Y10T 74/18856* (2015.01)

(58) **Field of Classification Search**

USPC 404/118

IPC E01C 2301/20

See application file for complete search history.

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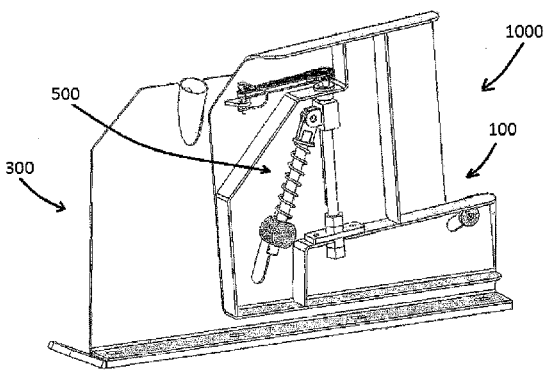
Primary Examiner — Gary Hartmann

(74) *Attorney, Agent, or Firm* — David M. Breiner; Christopher A. Presley

(57) **ABSTRACT**

Disclosed is an assembly that may be used with a machine, such as, but not limited to, a screed. In example embodiments, the assembly may include a first member, a second member adjacent to the first member, and a first actuator configured to rotate the second member with respect to the first member and transfer a biasing force to the second member. In example embodiments, the assembly may further include a second actuator configured to translate each of the first and second members.

19 Claims, 13 Drawing Sheets



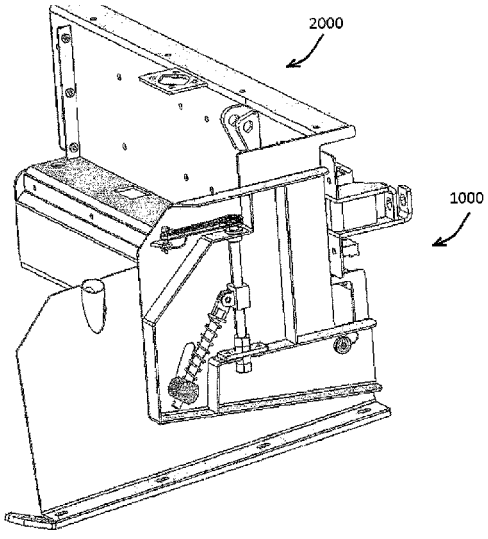


FIG. 1

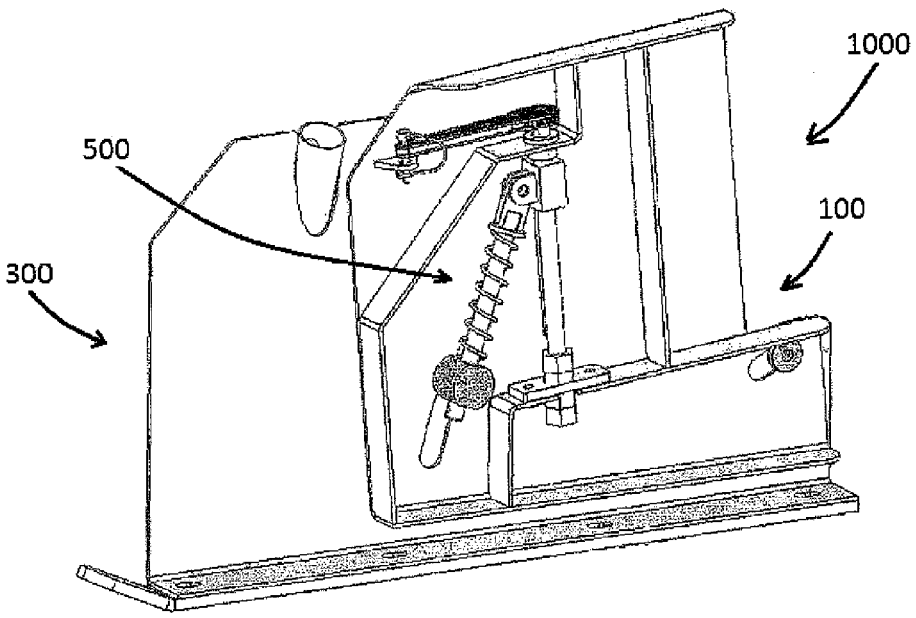


FIG. 2A

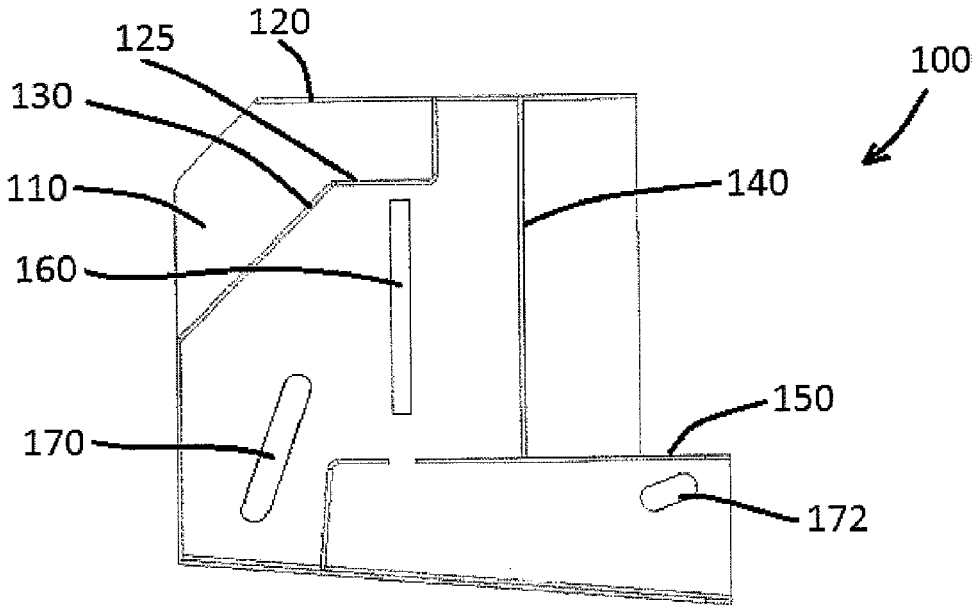


FIG. 2B

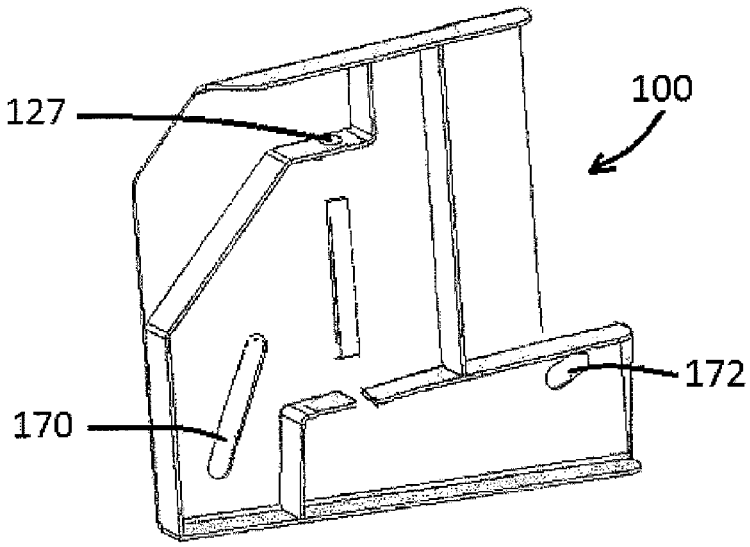


FIG. 3

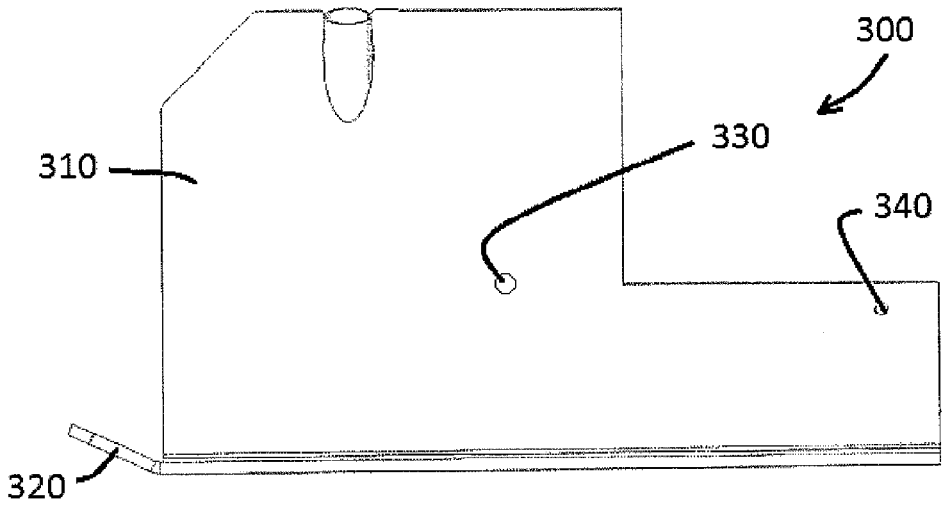


FIG. 4A

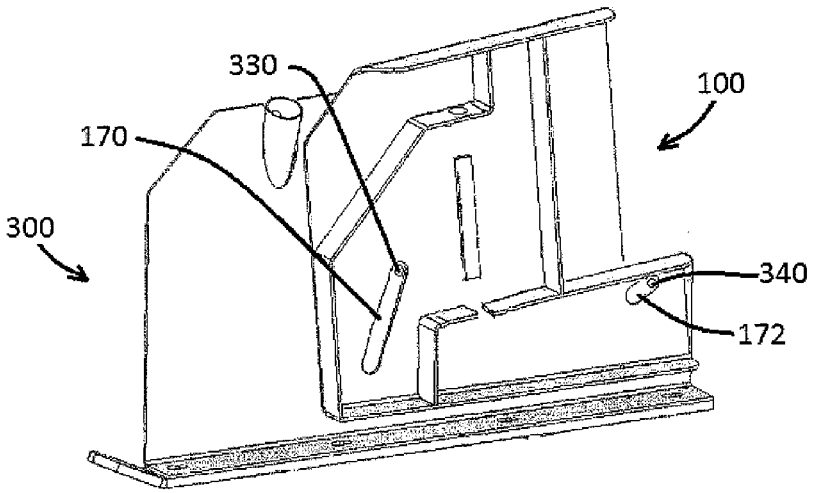


FIG.4B

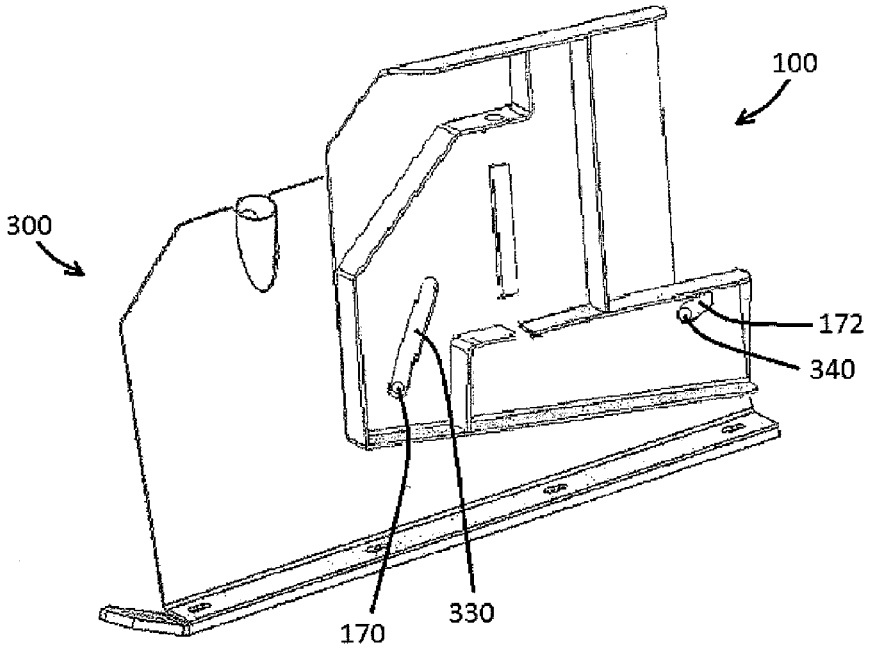


FIG. 5

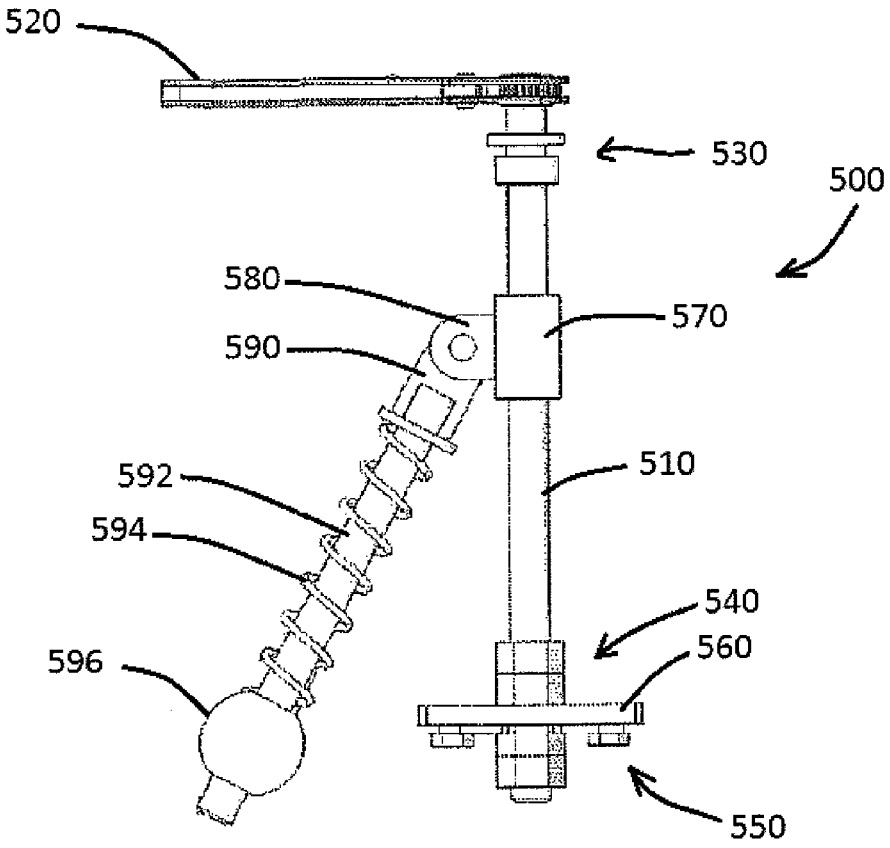


FIG. 6A

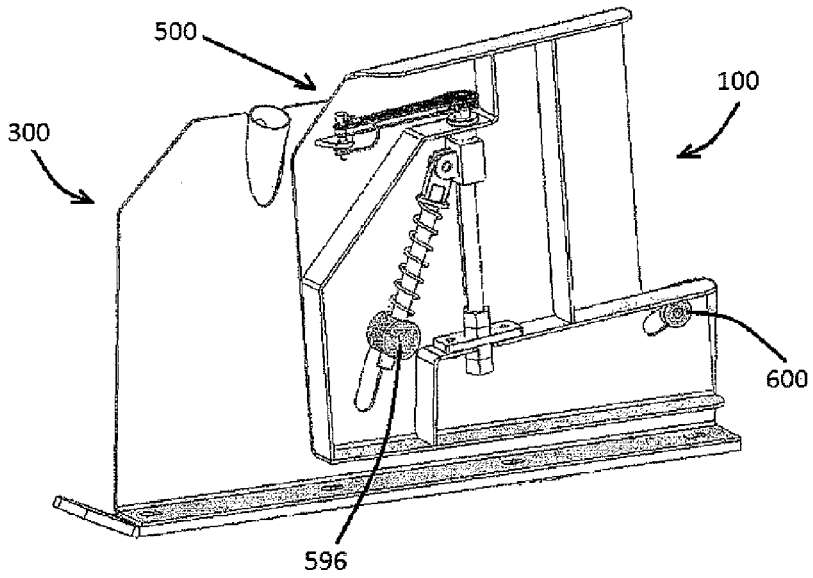


FIG. 6B

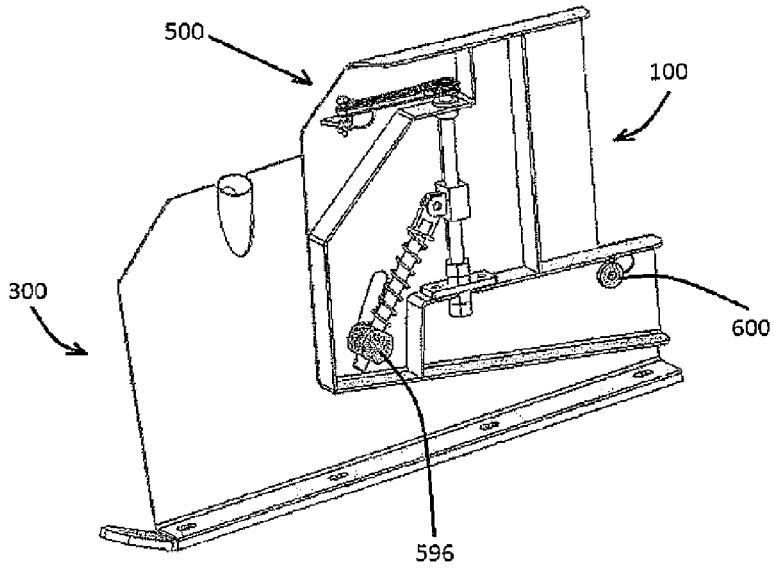


FIG. 7

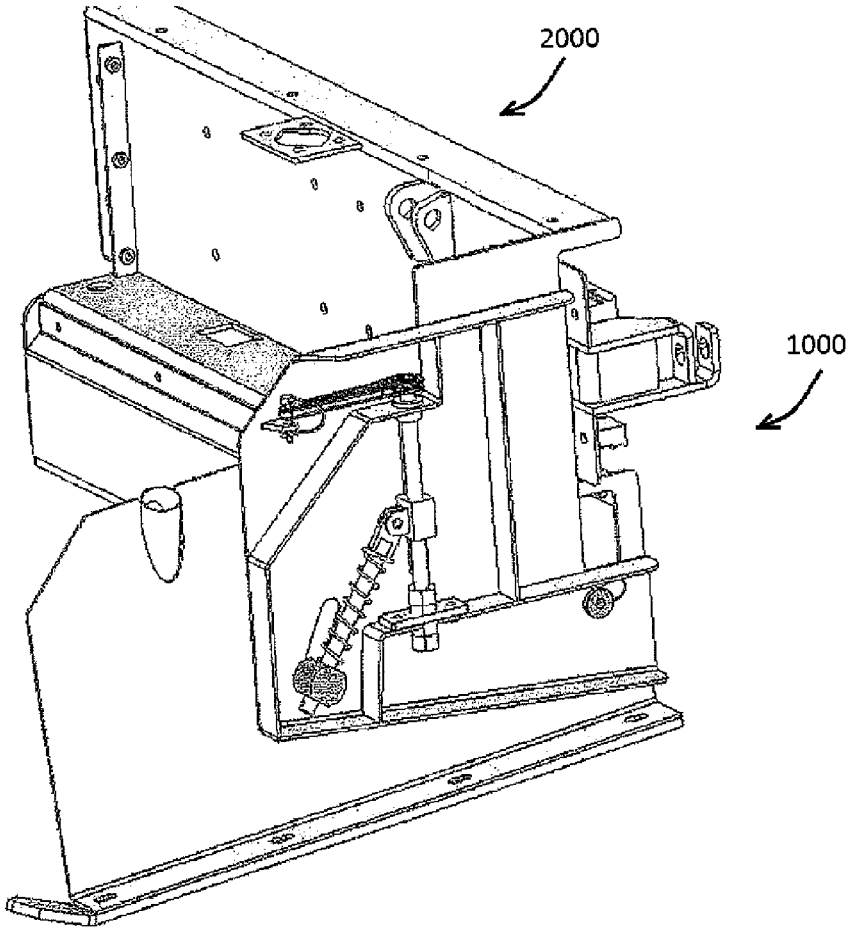


FIG 8

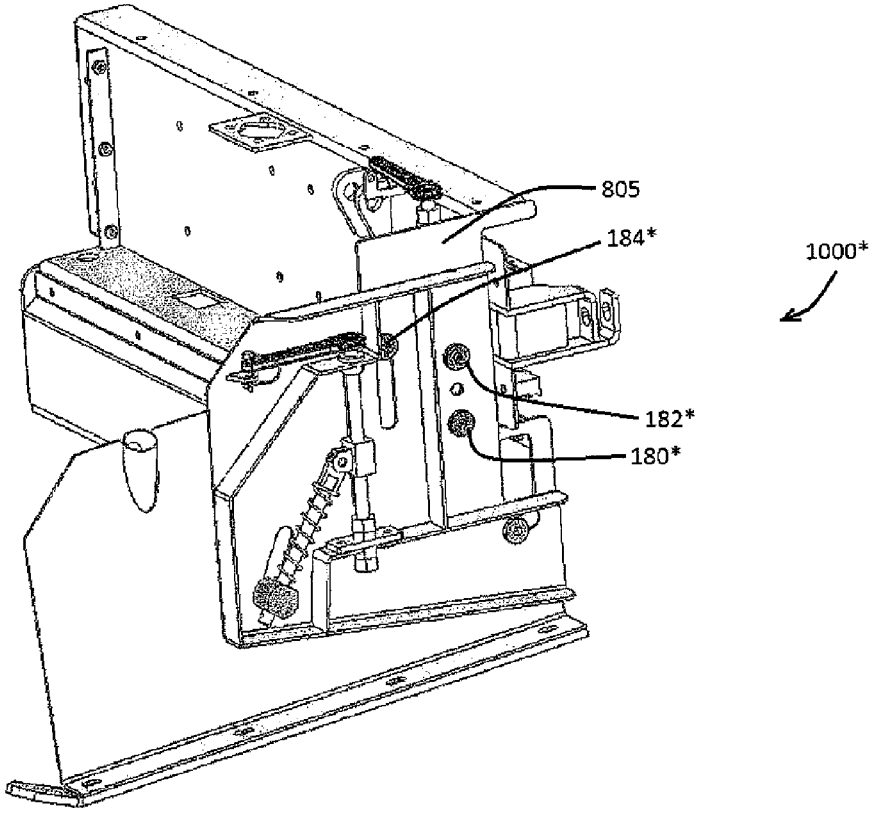


FIG. 9

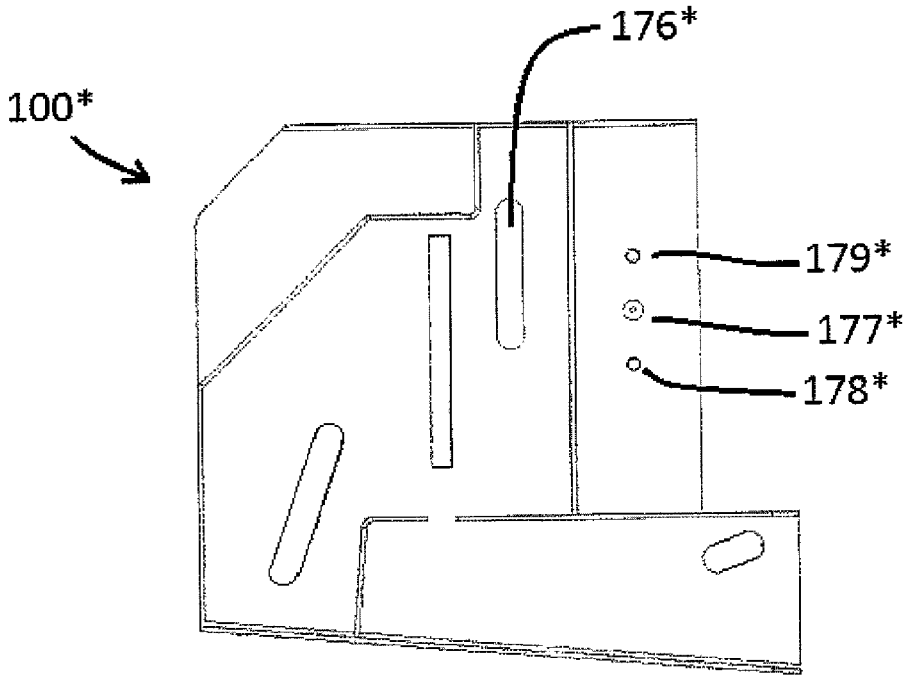


FIG. 10

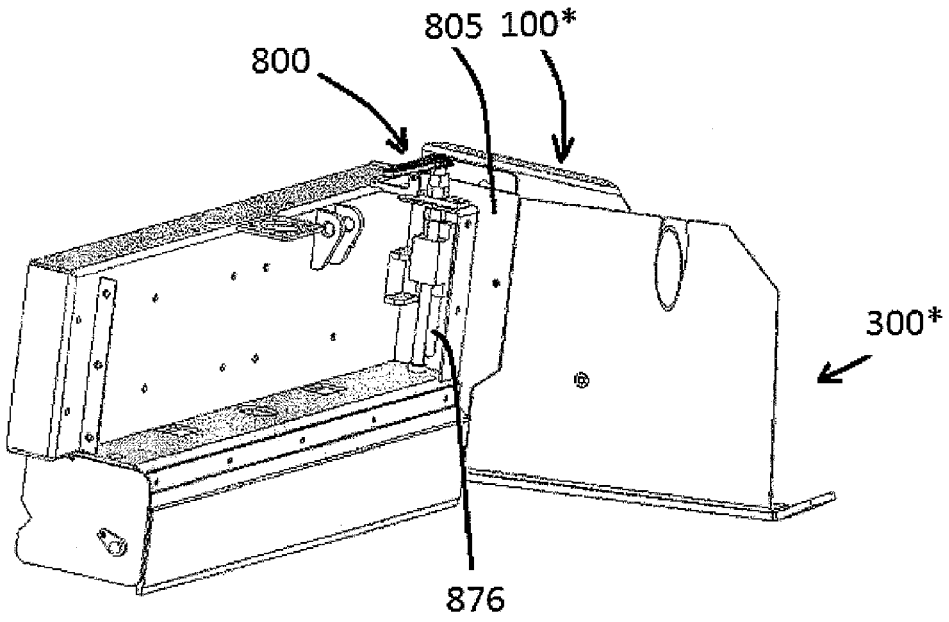


FIG. 11

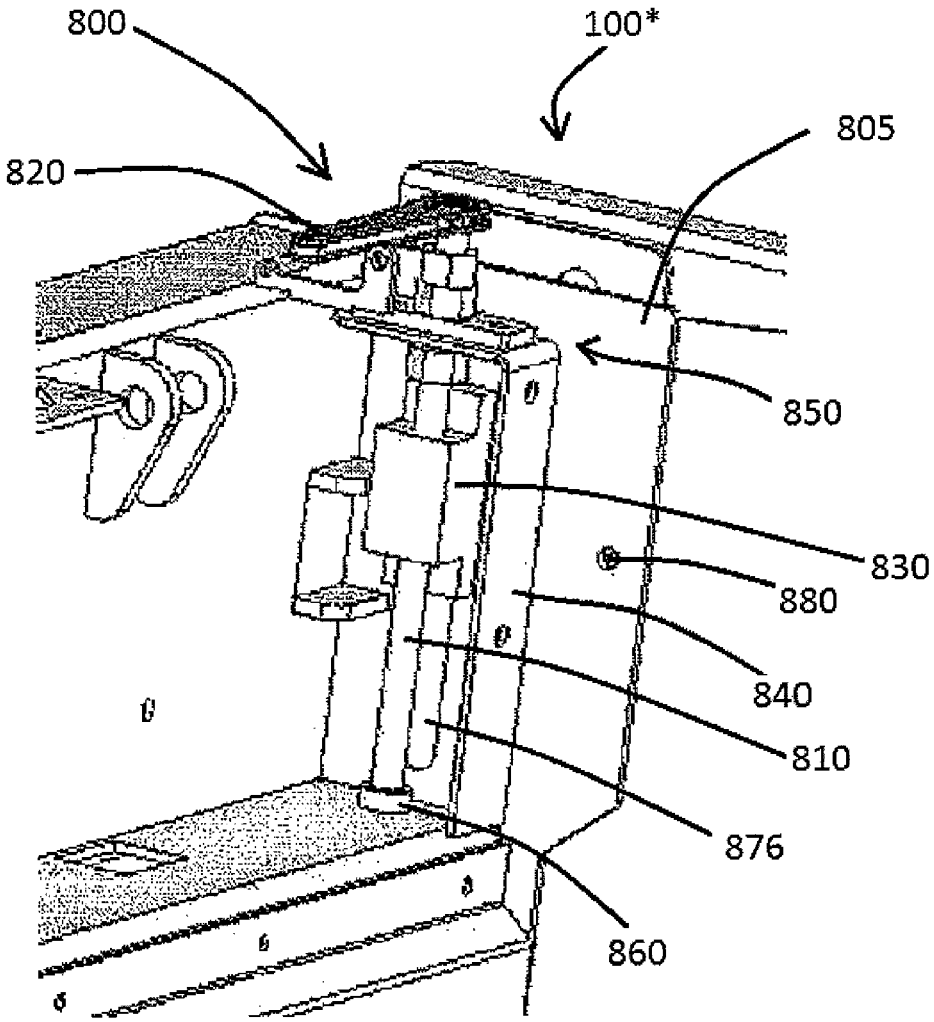


FIG. 12

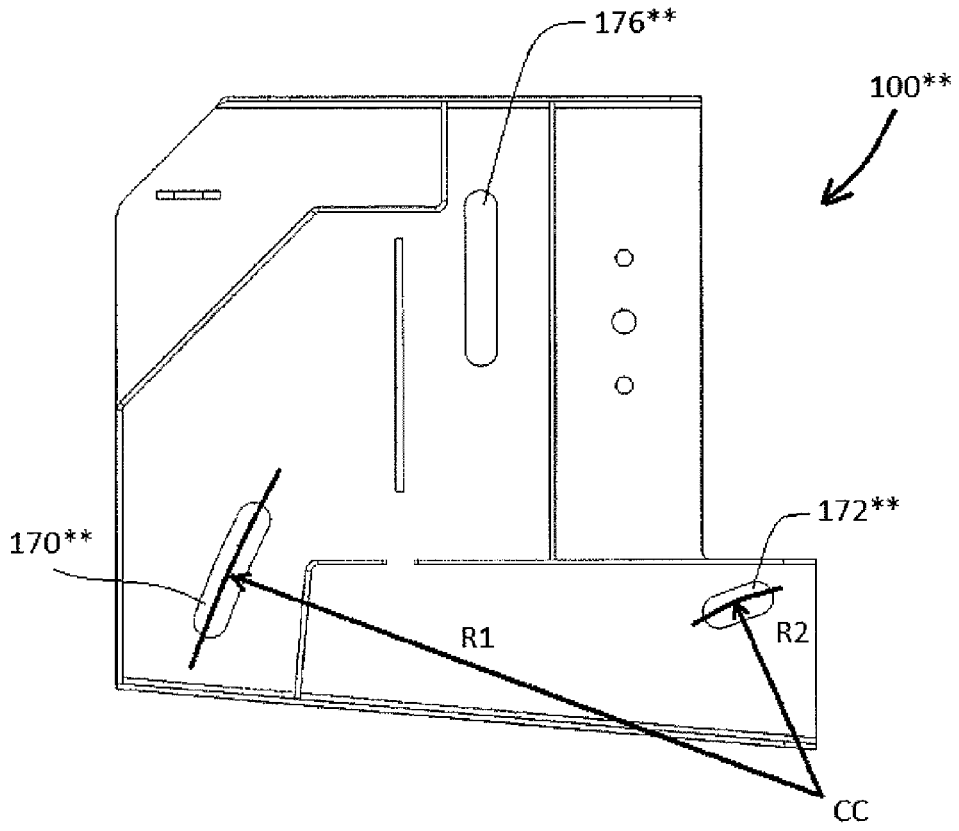
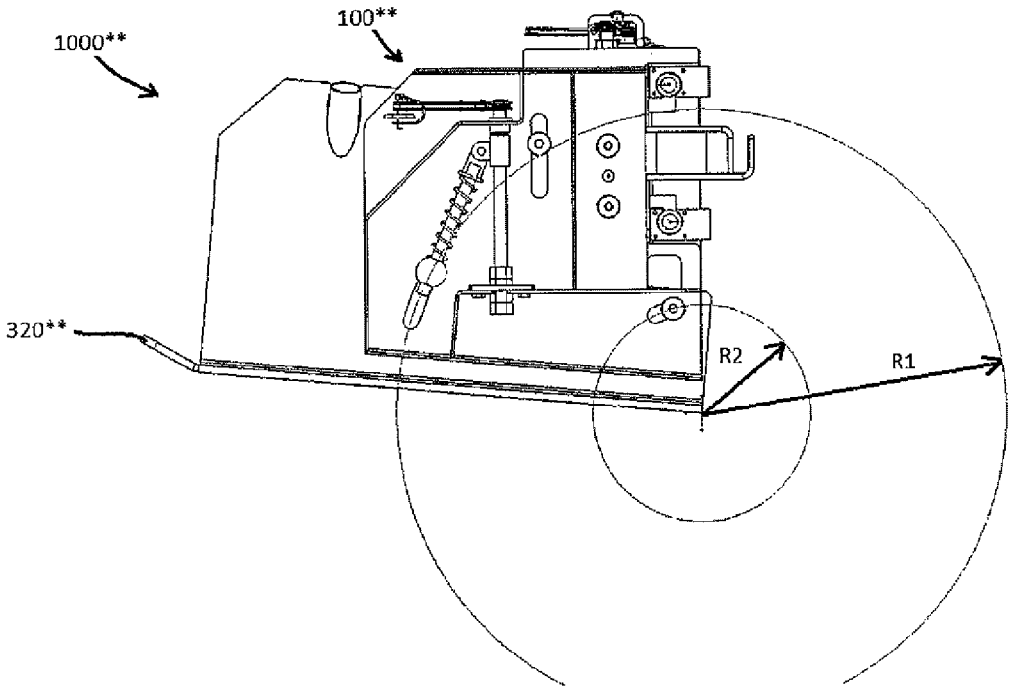


FIG. 13



ASSEMBLY FOR END GATE

BACKGROUND

1. Field

Example embodiments disclose an assembly. In example embodiments, the assembly may be used with various types of machines, such as, but not limited to, screeds.

2. Description of the Related Art

Screeds are mechanical devices used to construct various types of surfaces, for example, roadways. Screeds typically include assemblies, often called endgates, arranged at ends of the screeds. Conventional endgates are often fitted with wear shoes. In the conventional art, endgates typically include a plurality of independent adjustment means for adjusting a position of the wear shoe and a force on the wear shoe. In one conventional endgate, an elevation and orientation of an end gate is controlled by two independent means. In order to translate the wear shoe, the two independent adjustment means must be operated, for example, to raise or lower the wear shoe.

SUMMARY

Example embodiments disclose an assembly. In example embodiments, the assembly may be used with various types of machines, such as, but not limited to, screeds.

In accordance with example embodiments, an assembly may include a first member, a second member adjacent to the first member, and a first actuator configured to rotate the second member with respect to the first member and transfer a biasing force to the second member. In example embodiments, the assembly may further include a second actuator configured to translate each of the first and second members.

BRIEF DESCRIPTION OF THE DRAWINGS

Example embodiments are described in detail below with reference to the attached drawing figures, wherein:

FIG. **1** is a view of an assembly in accordance with example embodiments;

FIGS. **2**A-**2**B are views of a first member in accordance with example embodiments;

FIG. **3** is a view of a second member in accordance with example embodiments;

FIGS. **4**A-**4**B are views of the first member adjacent to the second member in accordance with example embodiments;

FIG. **5** is a view of an actuator in accordance with example embodiments;

FIGS. **6**A-**6**B are views of actuator displacing the second member with respect to the first member in accordance with example embodiments;

FIG. **7** is a view of a screed using the assembly as an endgate in accordance with example embodiments;

FIG. **8** is a view of an assembly in accordance with example embodiments;

FIG. **9** is a view of a first member in accordance with example embodiments;

FIG. **10** is a view of a screed using the assembly as an endgate in accordance with example embodiments;

FIG. **11** is a view of an actuator in accordance with example embodiments;

FIG. **12** is a view of a first member in accordance with example embodiments; and

FIG. **13** is a view of an assembly in accordance with example embodiments.

DETAILED DESCRIPTION

Example embodiments will now be described more fully with reference to the accompanying drawings. Example embodiments are not intended to limit the invention since the invention may be embodied in different forms. Rather, example embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. In the drawings, the sizes of components may be exaggerated for clarity.

In this application, when an element is referred to as being "on," "attached to," "connected to," or "coupled to" another element, the element may be directly on, directly attached to, directly connected to, or directly coupled to the other element or may be on, attached to, connected to, or coupled to any intervening elements that may be present. However, when an element is referred to as being "directly on," "directly attached to," "directly connected to," or "directly coupled to" another element or layer, there are no intervening elements present. In this application, the term "and/or" includes any and all combinations of one or more of the associated listed items.

In this application, the terms first, second, etc. are used to describe various elements and components. However, these terms are only used to distinguish one element and/or component from another element and/or component. Thus, a first element or component, as discussed below, could be termed a second element or component.

In this application, terms, such as "beneath," "below," "lower," "above," "upper," are used to spatially describe one element or feature's relationship to another element or feature as illustrated in the figures. However, in this application, it is understood that the spatially relative terms are intended to encompass different orientations of the structure. For example, if the structure in the figures is turned over, elements described as "below" or "beneath" other elements would then be oriented "above" the other elements or features. Thus, the term "below" is meant to encompass both an orientation of above and below. The structure may be otherwise oriented (rotated 90 degrees or at other orientations) and the spatially relative descriptors used herein interpreted accordingly.

Example Embodiments are illustrated by way of ideal schematic views. However, example embodiments are not intended to be limited by the ideal schematic views since example embodiments may be modified in accordance with manufacturing technologies and/or tolerances.

The subject matter of example embodiments, as disclosed herein, is described with specificity to meet statutory requirements. However, the description itself is not intended to limit the scope of this patent. Rather, the inventors have contemplated that the claimed subject matter might also be embodied in other ways, to include different features or combinations of features similar to the ones described in this document, in conjunction with other technologies. Generally, example embodiments disclose an assembly. In example embodiments, the assembly may be used with various types of machines, such as, but not limited to, screeds.

FIG. **1** is a view of an assembly **1000** in accordance with example embodiments. In example embodiments, the assembly **1000** may include a first member **100** and a second member **300** which may be arranged adjacent one another. In example embodiments, the assembly **1000** may further include a first actuator **500** configured to rotate the second member **300** with respect to the first member **100**. In example embodiments, the assembly **1000** may be usable for many purposes, such as, but not limited to, an end gate of a screed.

FIGS. **2**A and **2**B are views of the first member **100** in accordance with example embodiments. As shown in FIGS. **2**A and **2**B, the first member **100** may include a body **110** which may resemble a substantially flat plate. In example embodiments, several platforms may project from the body **110**. For example, the first member **100** may include a first platform **125**, a second platform **130**, a third platform **140**, and a fourth platform **150**. In example embodiments, each of the first, second, third, and fourth platforms **125**, **130**, **140**, and **150** may resemble plates which are perpendicular to the body **110**. Example embodiments, however, are not limited thereto as the first, second, third, and fourth platforms **125**, **130**, **140**, and **150** may resemble structures other than plates and are not required to be perpendicular to the body **110**.

In example embodiments, the body **110** may include a protrusion **160**. In example embodiments, the protrusion **160** may be configured to interface with a sleeve **570** of the first actuator **500** (shown at FIG. **5**) to prevent the sleeve **570** from rotating. In example embodiments, the sleeve **570** may resemble a rectangular box, but may also resemble another structure such as, but not limited to, structures having a U, C, L, I or T-shaped cross section.

In example embodiments, the first member **100** may include a first aperture **170** and a second aperture **172**. In example embodiments, each of the first and second apertures **170** and **172** may resemble elongated or slotted holes (as shown in the figures). Example embodiments, however, are not limited thereto. For example, in example embodiments the shapes of the first and second apertures **170** and **172** may resemble another shape such as, but not limited to, an arc, a circular, a rectangular, or an elliptical shape. As will be explained shortly, the first and second apertures **170** and **172** may allow structures to connect the first and second members **100** and **300** together and may allow the second member **300** to rotate relative to the first member **100**.

FIG. **3** is a view of the second structure **300** in accordance with example embodiments. As shown in FIG. **3**, the second structure **300** may resemble a plate like structure having a body **310**. In example embodiments, the body **310** may have structure **320**, for example, a wear shoe, attached to a bottom of the body **310**. In example embodiments, the structure **320** may be configured to contact a surface, for example, asphalt on a road, and may be used for edging. In example embodiments, the body **310** may include a first aperture **330** and a second aperture **340**. In example embodiments, the first and second apertures **330** and **340** may have a spacing which allows them to align with the first and second apertures **170** and **172** of the first member **100**.

FIGS. **4**A and **4**B illustrate the first member **100** and the second member **300** arranged adjacent to one another. As shown in FIGS. **4**A and **4**B, the first and second members **100** and **300** may be arranged in a first position (see FIG. **4**A) so that the first apertures **170** and **330** and the second apertures **172** and **340** of the first and second members **100** and **300** overlap one another. In example embodiments, the second member **300** may be rotated to a second position, as shown in FIG. **4**B. During the rotation, the first apertures **170** and **330** and the second apertures **172** and **340** of the first and second members **100** and **300** remain overlapped with one another.

FIG. **5** is a view of the first actuator **500** in accordance with example embodiments. As shown in FIG. **5**, the first actuator **500** may include a cylindrical member **510**, the sleeve **570** partially enclosing the cylindrical member **510**, and a handle **520** configured to rotate the cylindrical member **510**. In example embodiments, the cylindrical member **510** may include external threads. In example embodiments, the sleeve **570** may include a cylindrical hole having threads configured to engage the threads of the sleeve **570**. Thus, in example embodiments, the sleeve **570** may travel along a length of the cylindrical member **510** as the cylindrical member **510** is rotated by the handle **520**. For example, if the cylindrical member **510** is rotated counterclockwise the sleeve **570** may move in a first direction along the cylindrical member **510** and if the cylindrical member **510** is rotated clockwise the sleeve **570** may move in a second direction along the cylindrical member **510**.

In example embodiments, the sleeve **570** may include a groove configured to interface with the protrusion **160** of the first member **100**. For example, in the event the protrusion **160** has a rectangular cross-section, the groove may have a rectangular cross section into which the protrusion **160** may be inserted. Thus, the sleeve **570** may move along a length of the protrusion **160**.

In example embodiments, the sleeve **570** may be attached to a rod **592**. For example, in example embodiments, the sleeve **570** may include a tab **580** which may be pin-connected to a bracket **590** which in turn may be connected to the rod **592**. In example embodiments, a biasing device **594**, for example, a spring, may be configured to bias a first connector **596** along a length of the rod **592**. For example, the biasing device **594** may be a coil spring wrapped around the rod **592** and arranged between the first connector **596** and the bracket **590**. In example embodiments, the first connector **596** may include a cylindrical hole through which the rod **592** may be inserted. In example embodiments, the first connector **596** may move along the length of the rod **592** but may be biased into a position by the biasing device **594**.

In example embodiments, the first connector **596** may be configured to attach the first member **100** to the second member **300**. For example, the first connector **596** may include a cylindrical member that protrudes through each of the first apertures **170** and **330** and may be held in place by a pin or a nut. In example embodiments, a second connector **600** (see FIGS. **6**A-**6**B) may also attach the first and second members **100** and **300** together. For example, the second connector may include a cylindrical member that passes through each of the second apertures **172** and **340** and may be held in place by a pin or a nut.

In example embodiments, the first actuator **500** may be held in place by a first fastening members such as plates, bracket, and/or screws. For example, in example embodiments, a first end of the cylindrical member **510** may pass through a hole **127** in the first platform **125** and held in place by a pair of securing members **530** which may resemble nuts or washers. A second end of the cylindrical member **520** may be inserted into a notch formed in the fourth platform **150** and may be secured in place by a first pair of securing members **540**, a second pair of securing members **550**, and a bracket **560** which may be fastened to the fifth platform **150**, for example, by using screws or welds. In example embodiments, the first and second pair of securing members **540** and **550** may resemble washers or nuts.

In example embodiments, the manner in which the first actuator **500** is secured to the first member **100** is exemplary only and is not intended to limit example embodiments. For example, rather than providing a hole **127** in the first platform **125**, the first platform **125** may include a notch into which a first end of the cylindrical member **510** may be inserted and the fourth platform **150** may include a hole (rather than a notch) into which as second end of the cylindrical member **510** may be inserted.

FIGS. **6**A and **6**B illustrate the first actuator **500** attached to the first member **100**. As shown in FIGS. **6**A and **6**B, the first and second members **100** and **300** are secured to each other by

the first and second connectors **596** and **600**. As shown in FIG. **6**A, the first connector **596** and the second connector **600** may be arranged in a first position wherein the first connector **596** and the second connector **600** are arranged at a rightmost position within their respective slots. In example embodiments, the handle **520** of the first actuator **500** may be turned to rotate the cylindrical member **510** which in turn causes the sleeve **570** to move along cylindrical member **510**. As the sleeve **570** moves along the cylindrical member **510**, the first connector **596** is pushed along the first aperture **170** and the second connector **600** is moved along the second aperture **172** causing the second member **300** to translate and rotate with respect to the first member **100** to assume the second configuration shown in FIG. **6**B.

It is understood that example embodiments are not intended to be limited by the aforementioned description as several modifications of the example assembly **1000** are assumed to fall within the scope of the invention. For example, rather than having a second member **300** with a first and second aperture **330** and **340**, the second member **300** may have posts arranged where the first and second apertures **330** and **340** are illustrated and the posts may protrude through the first and second apertures **170** and **172** of the first member **100**. The posts may be inserted into or connected to the first and second connectors **596** and **600**. For example, each of the first and second connectors may resemble cylinders having an internally threaded hole which may be configured to receive the posts that may be protruding from the second member **300**. In this latter nonlimiting example embodiments, the posts may be threaded. Thus, the first and second connectors **596** and **600** may be screwed onto their respective posts.

In example embodiments, the assembly **1000** may have several uses. For example, as shown in FIG. **7**, the assembly **1000** may fit at an end of a screed **2000** and thus may be used in devices that form concrete and/or asphalt structures. In example embodiments, because of the first connector **596** may move along the rod **592**, some flexibility is imparted to the assembly **1000**. Thus, in example embodiments, the assembly **1000** may be able to absorb shock that may be imparted to it during use as an end gate of a screed **2000**.

FIG. **8** is a view of a modified assembly **1000*** fitted on an end of a screed **2000** in accordance with example embodiments. In example embodiments, the modified assembly **1000*** may be substantially the same as the assembly **1000**, thus, only the differences will be pointed out with particularity.

Referring to FIG. **9**, the modified assembly **1000*** may include a first member **100*** which may be substantially the same as the first member **100**. However, as shown in FIG. **9**, the first member **100*** may include a third aperture **176*** as well as fourth and fifth apertures **178*** and **179***. In example embodiments, the third aperture **176*** may be configured to accommodate a connector **184***(see FIG. **8**) which may pass through the third aperture **176*** to connect to a member **805** (see FIG. **10**), for example a back plate, which may be rigidly connected to the screed **2000**. In example embodiments, the fourth and fifth apertures **178*** and **179*** may be configured to receive fourth and fifth connectors **180*** and **182*** which may pass through the first member **100*** to connect the first member **100*** to a second actuator **800** that may be attached to the screed **2000**. In example embodiments, the member **805** may include a slot **876** through which the fourth and fifth connectors **180*** and **182*** may pass so that the fourth and fifth connectors **180*** and **182*** may attach to a sleeve **830** of the second actuator **800**.

Referring to FIG. **11**, the second actuator **800** is illustrated as being comprised of a cylindrical member **810**, a sleeve **830**, and a handle **820**. In example embodiments, the cylindrical member **810** may be a threaded member and the sleeve **830** may include a cylindrical hole through which the cylindrical member **810** may pass. In example embodiments, the cylindrical hole of the sleeve **830** may include threads configured to engage the threads of the cylindrical member **810**. Thus, in example embodiments, as the handle **820** is turned, the cylindrical member **810** may rotate which in turn causes the sleeve **830** to move along a length of the cylindrical member **810**.

In example embodiments, the screed **2000** may include a platform **840** which may include a hole on a top portion of the platform **840**. In example embodiments, the cylindrical member **810** may pass through the hole and to a support member **860**. In example embodiments, the cylindrical member **810** may be held in place by fastening members **850** which may fasten the cylindrical member **810** to the platform **840**. In example embodiments, the fastening members **850** may resemble a plate which may be fastened to the platform **840** by a plate which may in turn be fixed to the platform **840** by a conventional means such as, but not limited to, welding or screws. In example embodiments, the fastening members **850** may be configured to prevent the cylindrical member **810** from moving vertically.

In example embodiments, the third and fourth fasteners **180*** and **182*** may pass through an aperture **876** that may be in the member **805** of the screed **2000**. In example embodiments, the third and fourth fasteners **180*** and **182*** may pass through the fourth and fifth holes of the first member **100*** to connect the sleeve **830** to the first member **100***. In example embodiments, as the handle **820** is turned, the cylindrical member **810** turns causing the sleeve **830** to move along the cylindrical member **810**. Because the first member **100*** may be attached to the sleeve **830**, the sleeve **100*** may move along a length of the cylindrical member **810** as the sleeve **830** moves along the cylindrical member **810**.

Example embodiments provide an example of an assembly. In example embodiments, the assembly may be comprised of a first member (for example, **100** or **100***), a second member adjacent to the first member (for example, **300** or **300***), a first actuator **500** configured to rotate the second member (for example, **300** or **300***) with respect to the first member (for example, **100** or **100***) and transfer a biasing force to the second member (for example, **300** or **300***). In example embodiments, biasing force may be generated by a biasing member/device **594** which may be, but is not limited to, a coil spring.

In example embodiments, the first member (**100** or **100***) may include an elongated hole (for example, **170**) and a second hole (for example **172**) which may also be an elongated hole.

In example embodiments, the assembly may further include a first connector (for example, **596**) connecting the first member (**100** or **100***) to the second member (for example, **300** or **300***) and a second connector (for example **600**) connecting the first member (**100** or **100***) to the second member (**300** or **300***), wherein the first connector (for example, **596**) is configured to slide along the elongated hole (for example, **170**).

In example embodiments, the first actuator **500** may be configured to attach to the first connector (for example, **596**). In example embodiments, first actuator **500** may include a rod (for example, **592**) and the first connector (for example, **596**) may be configured to slide along the rod (for example, **592**). In example embodiments, the first actuator **500** may include a biasing member (for example, **594**) configured to bias the

first connector (for example, **596**) and may also include a handle (for example, **520**) operatively connected to the first connector (for example, **596**). In example embodiments, the first actuator **500** may further include a cylindrical member **510** and a sleeve **570** engaged with the cylindrical member **510** and the rod **592**.

In example embodiments, the assembly may further include a second actuator (for example, **800**) configured to move the first member (for example, **100***) and the second member (for example **300***) in a first direction. The assembly may also include a third connector (for example, one of 180* and **182***) connecting first member (for example, **100***) to the second actuator (for example, **800***). In example embodiments, the second actuator (for example, **800**) may include a handle (for example, **820**) operatively connected to the third connector (for example one of 180* and **182***). In example embodiments, the assembly may further include a backplate (for example, **805**) with an elongated hole (for example, **876**) through which the third connector may pass. In example embodiments, the second actuator **800** may include a cylindrical member **810** and a sleeve **830** engaged with the cylindrical member and the third connector.

The assemblies of example embodiments provide several advantages over the prior art. For example, in example embodiments, the assemblies may include a wear shoe which may be translated in a first or second direction by operating only a single actuator whereas prior art assemblies require an operation of two or more actuators to move a shoe. Furthermore, in example embodiments, an angle of a wear shoe may be adjusted by operating a single actuator whereas prior art assemblies typically require adjusting an angle of the wear shoe by operating two or more actuators.

FIG. **12** is another example of a first member **100**** in accordance with example embodiments. In example embodiments, the first member **100**** may be substantially identical to the first members **100** and **100***. For example, in example embodiments, the first member **100**** may have a first aperture **170**** and a second aperture **172****. However, in the first member **100**** of FIG. **12**, the first aperture **170**** and the second aperture **172**** are arc shaped slots. The first aperture **170****, for example, may have a substantially constant curvature with a radius of curvature of R1. The second aperture **172**** may also have a substantially constant curvature with a radius of curvature of R2. In example embodiments, the center of curvature CC for each of the first and second apertures **170**** and **172**** may be coincident. Thus, in example embodiments, the first member **100*** may rotate about the center of curvature CC of each of the first and second apertures **170**** and **172****. Example embodiments, however, are not intended to be limited by the above features. For example, each of the first and second apertures **170**** and **172**** may not have constant curvatures and may not have a common center of curvature.

FIG. **13** is a view of an assembly **1000**** in accordance with example embodiments. In example embodiments, the assembly **1000**** of example embodiments may be substantially similar to the assembly **1000** and **1000*** except that the assembly **1000**** includes the first member **100**** rather than the first member **100** and **100***. In the assembly **1000**** of FIG. **13**, the center of curvature of the first aperture **170**** and **172**** may be coincident and may coincide with a corner of the structure **320****, which may be, but is not limited to, a wear shoe. Thus, in example embodiments, the first member **100**** of the assembly **1000**** may rotate about a corner of the structure **320****.

In example embodiments, the assembly **1000**** may attach to a screed in a manner similar to the assemblies **1000** and **1000***, thus, a detailed description thereof is omitted for the sake of brevity.

Example embodiments of the invention have been described in an illustrative manner. It is to be understood that the terminology that has been used is intended to be in the nature of words of description rather than of limitation. Many modifications and variations of example embodiments are possible in light of the above teachings. Therefore, within the scope of the appended claims, the present invention may be practiced otherwise than as specifically described.

What we claim is:

1. An end gate adjustable in rotation and height, the end gate comprising:

a first member;

a second member adjacent to the first member;

a first actuator configured to rotate the second member with respect to the first member and transfer a biasing force to the second member; wherein the first member includes an elongated arc shaped hole and a second arc shaped hole; and a center of curvature of each of the first and second arc shaped holes is coincident.

2. The end gate of claim **1**, further comprising:

a first connector connecting the first member to the second member; and

a second connector connecting the first member to the second member, wherein the first connector is configured to move along the elongated hole.

3. The end gate of claim **2**, wherein the first actuator is configured to attach to the first connector.

4. The end gate of claim **3**, wherein the first actuator includes a rod and the first connector is configured to slide along the rod.

5. The end gate of claim **3**, wherein the first actuator includes a biasing member configured to bias the first connector.

6. The end gate of claim **3**, wherein the first actuator includes a handle operatively connected to the first connector.

7. The end gate of claim **3**, wherein the first actuator includes a cylindrical member and a sleeve engaged with the cylindrical member and the rod.

8. The end gate of claim **1**, further comprising:

a second actuator configured to move the first member and the second member in a first direction; and a third connector connecting first member to the second actuator.

9. The end gate of claim **8**, wherein the second actuator includes a handle operatively connected to the third connector.

10. The end gate of claim **9**, further comprising:

a backplate with an elongated hole through which the third connector passes.

11. The end gate of claim **10**, wherein the second actuator includes cylindrical member and a sleeve engaged with the cylindrical member and the third connector.

12. A screed comprising:

the end gate of claim **1**.

13. The screed of claim **12**, wherein the first member includes a first slotted hole and a second slotted hole.

14. The screed of claim **13**, further comprising:

a first connector connecting the first member to the second member;

a second connector connecting the first member to the second member; and

a third connector connecting the first member to the second actuator, wherein the first connector is configured to slide along the elongated hole, the second connector is

configured to slide in the second hole, and the third connector is configured slide in a hole arranged in a backplate between the first member and the second actuator.

15. An assembly comprised of:

a first member having a first elongated hole;

a second member adjacent to the first member;

a first actuator configured to rotate the second member with respect to the first member and transfer a biasing force to the second member;

a second actuator configured to move the first member and the second member in a first direction;

a first connector connecting the first member to the second member, the first connector being configured to move along the first elongated hole;

a second connector connecting the first member to the second member;

a third connector connecting first member to the second actuator.

16. The assembly of claim **15**, wherein the first actuator is configured to attach to the first connector.

17. The assembly of claim **15**, wherein the first actuator includes a rod and the first connector is configured to slide along the rod.

18. The assembly of claim **15**, wherein the first actuator includes a biasing member configured to bias the first connector.

19. The assembly of claim **15**, wherein the first actuator includes a handle operatively connected to the first connector and the second actuator includes a handle operatively connected to the third connector.

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